Row Operations

Types of systems:

2D \mathbb{R}^2 ::

- Non-parallel lines
- Identical lines
- Parallel lines

3D \mathbb{R}^3 :

- Unique solution
- Infinite number of solutions
- No solutions

Row operations:

- (Replacement/ Addition) Add a multiple of one row to another.
- (Interchange) Interchange two rows.
- (Scaling) Multiply a row by a non-zero scalar.

$$\left\{egin{array}{l} x_1-2x_2+x_3=0\ 2x_2-8x_3=8\ 5x_1-5x_3=10 \end{array}
ight.$$

Row₁ +Row₂

$$\begin{cases} x_1 - 7x_3 = 8 \\ 2x_2 - 8x_3 = 8 \\ 5x_1 - 5x_3 = 10 \end{cases}$$

$$\begin{cases} x_1 - 7x_3 = 8 \\ x_2 - 4x_3 = 4 \\ 5x_1 - 5x_3 = 10 \end{cases}$$

$$Row_3 - 5 Row_1$$

$$\begin{cases} x_1 - 7x_3 = 8 \\ x_2 - 4x_3 = 4 \\ 10x_2 - 10x_3 = 10 \end{cases}$$

**Note: Row_1 represents the original Row_1 not the modified Row_1

$$Row_3$$
 - 10 Row_2

$$\begin{cases} x_1 - 7x_3 = 8 \\ x_2 - 4x_3 = 4 \\ 30x_3 = -30 \end{cases}$$

$$x_3 = -1$$

Substiution

$$x_1 = 1$$

$$x_2 = 0$$